

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 87-070

SITE CLEANUP REQUIREMENTS FOR:

SHELL OIL COMPANY
MARTINEZ MANUFACTURING COMPLEX
CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. Shell Oil Company (hereinafter called the Discharger), owns and operates a petroleum refinery in Martinez, Contra Costa County. A location map is included in attachment A.
2. A site-wide geotechnical report was requested in 1981, to be submitted as part of a Report of Waste Discharge. This report was due in the fourth quarter of 1982, but was submitted in October of 1983. This report identified 14 inactive waste disposal areas and numerous petroleum hydrocarbon spill sites at the facility.
3. On June 23, 1983, Waste Discharge Requirements, Board Order No. 83-17, were issued for sludge drying beds at the refinery. Finding #7 of that Order states that "this order is intended to address only the waste water treatment site (sludge drying beds) and shall not be interpreted as a waiver for the need for Waste Discharge Requirements for other areas within the discharger's facility where wastes have been or are being treated, stored or disposed." Similarly, this Order is intended to address only the petroleum hydrocarbon spill sites, and should not be interpreted as a waiver of Waste Discharge Requirements for other areas within the discharger's facility where wastes have been or are being treated, stored or disposed.
4. The 1983 geotechnical report was inadequate with respect to site specific geologic and hydrogeologic information as noted by State Board and Regional Board geologic staff. On September 14, 1984, the Board staff requested the Discharger perform additional work to define the site geology, site hydrogeology, the chemical and physical characteristics of the inactive waste disposal sites, the extent of the hydrocarbon spill sites, and the potential impact of these wastes upon the surface and groundwaters at the facility.
5. Work began on the investigation, identified in Finding 4, on July 31, 1985 and was scheduled to be completed in November of 1985. Quarterly reports on groundwater quality were to be submitted every 16 weeks thereafter for 4 quarters.

6. The first two quarterly reports detailing the groundwater monitoring program, identified in Finding 4, were submitted in June of 1986, nearly one year late. The other two quarters of groundwater monitoring data were submitted by September of 1986.
7. Some site specific geologic, hydrogeologic, and waste site delineation data have not yet been submitted. In a letter dated September 24, 1986, the Discharger stated that the complete waste site report, and hydrogeologic data would be submitted during the next quarter, of 1986. The data has not yet been submitted. The Calderon amendments to the Porter-Cologne Act require the discharger to submit this information as part of a Solid Waste Assessment Test (SWAT) by July 1, 1987.
8. The site hydrogeologic characterization has identified petroleum hydrocarbon floating in 40 out of 147 groundwater monitoring wells at the Martinez Manufacturing Complex. The Discharger has taken minimal action to remediate these spills.
9. The largest of the two hydrocarbon spill sites, near Reservoirs 1, 2, and 3, contains approximately 15,000 barrels of crude oil that have leaked from storage tanks in the central area of the refinery (Attachment A2). Oil has been detected in 5 wells up to 20 feet thick, but the lateral an vertical extent, and the rate and direction of movement of the plume is unknown. Chemical characteristics of the hydrocarbon, and its potential to impact water quality is unknown. Geology and hydrogeology in the area of the spill has been inadequately defined. This plume is moving in the subsurface, and is discharging to Lake Slobodnik, which may be considered a tributary to Carquinez Strait, during heavy rain events. This plume may also be discharging to usable groundwater of the bay plain, as the spill is located at the head of local alluvial fans, recharge areas for those aquifers.
10. The second major hydrocarbon spill site is located on the southwest flank of Crude Hill (Attachment A2). An estimated 5000 barrels of jet fuel have been spilled, and floating product has been detected in two wells. In the 1983 hydrogeologic report the Discharger stated that the product plume is difficult to define since it is migrating through jointed sandstone. The lateral and vertical extent, the chemical characteristics, the rate and direction of product movement, potential impact on water quality and the geology and hydrogeology in the area of the spill have not been defined.
11. Floating petroleum hydrocarbon has been detected in numerous other wells at this facility. The sources, and quantity of spilled material are not known in many cases. The lateral and vertical extent, rate and direction of product movement, chemical characteristics of the petroleum hydrocarbons, potential impact on water quality and the geology and hydrogeology in the area of the spills have not been adequately defined.

12. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on July 21, 1982. The Basin Plan contains water quality objectives and beneficial uses for the Carquinez Straits and contiguous ground and surface waters.
13. The actual or potential beneficial uses for the groundwater underlying, and adjacent to the facility include:
 - a. Industrial process water supply
 - b. Industrial service water supply
 - c. Agricultural water supply
14. The existing beneficial uses of the Carquinez Strait include:
 - a. Industrial Service Water Supply
 - b. Navigation
 - c. Contact and Non-Contact Water Recreation
 - d. Ocean Commercial and Sport Fishing
 - e. Wildlife Habitat
 - f. Preservation of Rare and Endangered Species
 - g. Fish Migration
 - h. Fish Spawning
 - i. Estuarine Habitat
15. The discharge of these petroleum hydrocarbons creates or threatens to create a condition of pollution or nuisance.
16. Ample time and opportunity has been given to the Discharger to define the local geology, to define the extent, rate of movement and potential impact on water quality from the petroleum hydrocarbons, and devise a program to adequately remediate these problems. The Discharger's exploration and remedial action attempts at the site have been plagued by delays and have been technically inadequate.
17. These Site Cleanup Requirements are written to direct an investigation to define the lateral and vertical extent of the petroleum hydrocarbon spill sites, the local geology, the rate and direction of groundwater and product movement, and the potential impact of the petroleum hydrocarbon on groundwater quality. This investigation should be designed to prevent or remediate migration of petroleum product, and finally remove product from the subsurface and restore the groundwater quality to acceptable levels under a strict time schedule.
18. This action is an order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the CEQA pursuant to Section 15321 of the Resources Agency Guidelines.
19. The Board has notified the Discharger and interested agencies and persons of its intent under the California Water Code, Section 13304, to prescribe Site Cleanup Requirements for the discharge, and has provided them with ample opportunity to submit their written views and

recommendations.

20. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that Shell Oil Company cleanup and abate the effects as described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.
2. Further significant migration of the pollutants through subsurface transport to waters of the State is prohibited.
3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of pollutants are prohibited.

B. SPECIFICATIONS

1. The storage, handling, treatment or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.
2. The Discharger shall conduct monitoring activities as needed to define the current local hydrogeologic conditions, and the lateral and vertical extent of soil and groundwater pollution. Should monitoring results show evidence of pollutant migration, additional characterization of pollutant extent may be required.

C. PROVISIONS

1. The discharger shall submit to the Board, acceptable monitoring program reports containing the results of the work performed according to the program as attached and prescribed by the Board's Executive Officer.
2. The Discharger shall comply with the Prohibitions and Specifications as outlined above, in accordance with the following time schedule and tasks:

A) INVESTIGATION AND REMEDIATION OF PETROLEUM HYDROCARBON SPILL SITES

- 1) IMPLEMENTATION DATE: July 1, 1987

TASK: Implement a program to monitor petroleum product thickness in all groundwater monitoring wells on a quarterly basis. Reports detailing the product thickness data will be submitted to the Regional Board quarterly. The reports will consist of the data submitted in a tabular format, a map illustrating the extent of the spill sites, and a discussion of any significant changes in the data (drastic changes from one measurement to the next, or a trend of generally increasing or decreasing product thickness).

- 2) COMPLETION DATE: July 1, 1987

TASK: Submit a technical report acceptable to the Executive Officer containing a proposal to: a) identify all contributing petroleum hydrocarbon pollution sources, b) provide an estimate of the quantity and type of petroleum hydrocarbons that were spilled, c) provide a complete chemical characterization of the spilled material, d) define the lateral and vertical extent of the spill sites, e) conduct a complete geologic and hydrogeologic investigation of the spill sites, and f) outline a system that will be used to rank the spill sites according to their potential impact on the environment. This proposal should place particular emphasis on characterization of the Crude Hill and Reservoir 1, 2, and 3 spill sites. (See Appendix A for the minimum steps necessary for an adequate investigation of these petroleum hydrocarbon spill sites.)

- 3) COMPLETION DATE: January 1, 1988

TASK: Submit a technical report acceptable to the Executive Officer documenting completion of tasks outlined in the proposal described in Task 2.

- 4) COMPLETION DATE: April 1, 1988

TASK: Submit a technical report acceptable to the Executive Officer which contains an evaluation of possible remedial actions, a recommended plan for remediation, and an implementation time schedule for remedial action at each petroleum hydrocarbon spill site. The proposal should include evaluation of: a) the removal and/or cleanup of polluted soils, and b) alternative systems to clean-up, contain or control polluted groundwater such that groundwater quality is restored to acceptable levels.

- 5) COMPLETION DATE: April 1, 1989

TASK: Submit a technical report acceptable to the Executive Officer documenting completion of tasks outlined in the proposal described Task 4.

- 6) COMPLETION DATE: July 1, 1989

TASK: Submit a technical report acceptable to the Executive Officer which documents the effectiveness of the remedial actions taken at each petroleum hydrocarbon spill sites.

3. The submittal of technical reports evaluating immediate, interim and final remedial measures will include a projection of the cost, effectiveness, benefits, and impact on public health, welfare, and environment of each alternative measure. The remedial investigation and feasibility study shall consider the guidance provided by Subpart F of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300), Section 25356.1 (c) of the California Health and Safety Code, RCRA guidance documents, and the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of the Waters in California."
4. If the discharger is delayed, interrupted or prevented from meeting one or more of the completion dates specified in this Order, the discharger shall promptly notify the Executive Officer.
5. Technical reports on compliance with the Prohibitions, Specifications, and Provisions of this Order shall be submitted quarterly to the Board commencing on July 1, 1987. On a quarterly basis thereafter, these reports shall consist of a letter report that, (1) summarizes work completed since submittal of the previous report, and work projected to be completed by the time of the next report, (2) identifies any obstacles which may threaten compliance with the schedule of this Order and what actions are being taken to overcome these obstacles, and (3) includes, in the event of non-compliance with Provision C.2. or any other Specification or Provision of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order.

The quarterly reports shall also include, but need not be limited to, updated water table and piezometric surface maps for all affected water bearing zones, and where applicable, updated cross-sectional geological maps describing the hydrogeological setting of the site, and appropriately scaled and detailed base

maps showing the location of all monitoring wells and extraction wells, and identifying adjacent facilities and structures.

6. The discharger shall submit to the Board, according to the schedule shown below, technical reports acceptable to the Executive Officer containing Quality Assurance Project Plans, Site Safety Plans, and Site Sampling Plans. The Quality Assurance Project Plans, Site Safety Plans, and Site Sampling Plans format and contents shall consider RCRA regulations and guidance documents.

Technical Report

Date Due

- | | |
|-----------------------------------|----------------|
| a. Quality Assurance Project Plan | July 1, 1987 |
| b. Site Sampling Plan | July 15, 1987 |
| c. Site Safety Plan | August 1, 1987 |
7. All hydrogeological plans, specifications, reports, documents, and each boring log, shall be signed by or stamped with the seal of a registered geologist or engineering geologist.
 8. All samples shall be analyzed by State certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control records for Board review.
 9. The discharger shall maintain in good working order, and operate, as efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order.
 10. Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be provided to the following agencies:
 - a. State Department of Health Services/TSCD
 - b. State Water Resources Control Board
 - c. U. S. Environmental Protection Agency, Region IX

The Executive Officer may additionally require copies of correspondence, reports and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order to be provided to a local repository for public use.

11. The discharger shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:
 - a. Entry upon premises in which any pollution sources exist, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

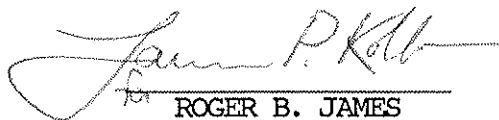
- b. Access to copy any records required to be kept under the terms and conditions of this Order.
 - c. Inspection of any monitoring equipment or methodology implemented in response to this Order.
 - d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.
12. The discharger shall file a report on any changes in site occupancy and ownership associated with the facility described in this Order.
14. The Board will review this Order periodically and may revise the requirements when necessary.

Pursuant to the California Water Code Sections 13304 and 13350, if the Discharger fails to comply with any provisions of this Order, the Executive Officer may request the Attorney General to take appropriate enforcement action against the Discharger, including injunctive relief, or the Regional Board may schedule a hearing to assess civil monetary liabilities and to request the Attorney General to take appropriate enforcement action against the Discharger, including injunctive and civil monetary remedies.

I, Roger B. James, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on June 17, 1987.

6/19/87

DATED



ROGER B. JAMES
Executive Officer

APPENDIX A

Investigation and Remediation of Petroleum Hydrocarbon Spill Sites

The following items must be considered in planning the geologic and hydrogeologic investigation and plan for remedial action.

1) A chemical characterization of the product to determine the soluble and volatile hydrocarbons and the soluble and total metals in the product: a fingerprint of the spilled material so it can be traced in the subsurface.

2) A detailed geologic investigation of the area of the plumes including consideration of the following methods:

a) regional or sub-regional aerial photograph fracture trace analysis to determine the orientation and frequency of the major joint and fracture sets in the bedrock in the area.

b) appropriate surface geophysical methods to map the horizontal extent of the product plumes and to map the bedrock structures in the area of the plumes.

c) appropriate soil-gas monitoring to trace the plume in the subsurface.

d) detailed geologic investigation to determine the nature of the alluvial, fill and bedrock materials, the nature of the joint and fracture sets in the bedrock, and the nature of the contact between the different geologic materials. This investigation should at a minimum include detailed geologic mapping of roadcuts and trenches within the refinery boundaries and an appropriate number of exploratory borings. The roadcut, trench and boring logs, for both the bedrock and the alluvial or fill material, should include detailed descriptions of, the rock type, color, mineralogy, gross petrography (grain size, sorting, and cementation), moisture content, crystallinity, presence of carbonates, fractures (location, size, and orientation) and the nature of any fillings, solution cavities, bedding orientation, depositional structures, tectonic structures, organic content, odor, and suspected contamination. The boring investigation should consist of all continuously cored boreholes to determine the nature of the geologic materials, as described above. These boreholes should be of sufficient depth to investigate a substantial amount of the unweathered bedrock (20 ft. of unweathered bedrock). The boring logs should be graphically presented and illustrate and describe the lithology in significant detail. The trench exploration program should consist of a sufficient number of trenches, oriented parallel and perpendicular to the suspected trace of the major joint and fracture sets in the area. Trenches should be dug in the vicinity of the plume. The trench logs should be illustrated in detail with accompanying detailed lithologic descriptions.

e) an investigation of anthropogenic features in the vicinity of the product plumes and how they may affect contaminant migration.

f) this geologic investigation should be supported by detailed boring, trench and roadcut logs (details as cited above) which should be compiled to create geologic maps, cross sections and fence diagrams of the appropriate size, scale and vertical exaggeration in the area of the plume(s). An appropriate scale is one such that a one foot thick sandy zone can be drawn and a six inch zone can be indicated on the cross sections.

g) upon completion of the geologic exploration program as detailed above, piezometers or very short screen-length wells should be installed in depth staggered clusters to determine the nature of the groundwater flow in the area of the plumes. This program should concentrate on fracture flow in the bedrock but should consider the flow through porous media to be more significant in the alluvial materials. This program should be designed to gather enough information to draw detailed flow nets from the data that has been gathered.

h) Groundwater monitoring wells should be installed in depth staggered clusters in the downgradient direction from the plumes. The direction of downgradient should take into account the fracture flow regime in the bedrock material. These wells should be designed and constructed in strict accordance with California Administrative Code, Title 23, Chapter 3, Subchapter 15, Article 5.

These investigations should be conducted with remedial and interim remedial measures in mind. At the conclusion of the investigation, these remedial measures should be proposed and implemented. Remedial measures should be designed to:

- 1) control sources of pollution (tanks and piping),
- 2) clean up polluted soils,
- 3) clean up, contain or control polluted groundwater such that groundwater quality is restored to acceptable levels

